



MATERIAL SAFETY DATA SHEET

(Essentially similar to U.S. Department of Labor Form OSHA-20)

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F-4604



PRODUCT	Hydrogen (High Pressure Gas)		
CHEMICAL NAME	Hydrogen	SYNONYMS	-----
FORMULA	H ₂	CHEMICAL FAMILY	-----
TRADE NAME	-----	MOLECULAR WEIGHT	2.016

See Section V for TLV information

BOILING POINT, 760 mm. Hg	-252.9°C (-423.2°F)	FREEZING POINT	-259.1°C (-434.4°F)
SPECIFIC GRAVITY (H ₂ O = 1)	Gas	VAPOR PRESSURE AT 20°C.	Gas
VAPOR DENSITY (air = 1)	0.0695	SOLUBILITY IN WATER, % by wt.	Negligible
PER CENT VOLATILES BY VOLUME	100	EVAPORATION RATE (Butyl Acetate = 1)	NA
APPEARANCE AND ODOR	Colorless, Odorless		

FLASH POINT (test method)	Flammable Gas	AUTOIGNITION TEMPERATURE	585°C (1085°F)
FLAMMABLE LIMITS IN AIR, % by volume	LOWER 4%	UPPER	75%
EXTINGUISHING MEDIA			

CO₂, Dry Chemicals, water spray or fog.

SPECIAL FIRE FIGHTING PROCEDURES

Evacuate all personnel from danger area. Immediately cool containers with water spray from **maximum distance**, taking care **not** to extinguish flames. Remove ignition sources if without risk. If flames are accidentally extinguished, explosive re-ignition may occur. Use self-contained breathing apparatus. Stop flow of gas if without risk while continuing cooling water spray. Remove all containers from area of fire if without risk. Allow fire to burn out.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Flammable gas. Flame is nearly invisible. Escaping gas may ignite "spontaneously". Hydrogen has a low ignition energy. Fireball is formed if gas cloud is ignited immediately after release.

Forms explosive mixtures with air and oxidizing agents. Container may rupture due to heat of fire. Do not extinguish flames due to possibility of explosive re-ignition. Flammable gas may spread from spill.

Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with approved explosion meter. No part of a container should be subjected to a temperature higher than 52 C (approximately 125°F). Most containers are provided with a pressure relief device designed to vent contents when they are exposed to elevated temperature.

IN CASE OF EMERGENCIES involving this material, further information is available at all times at this telephone number:

304: 744-3487

For routine information contact your local Linde Supplier.

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BOE-C6-0228358

PRODUCT: Hydrogen (High Pressure Gas)

F-4604

THRESHOLD LIMIT VALUE Simple asphyxiant (ACGIH – 1977)

EFFECTS OF OVEREXPOSURE AND EMERGENCY AND FIRST AID PROCEDURES

Hydrogen acts as an asphyxiant by displacing oxygen, and may cause atmospheres deficient in oxygen when ventilation is inadequate. Hydrogen may cause injury from fires and explosions.

SYMPTOMS OF ASPHYXIA: Headache, breathing and pulse rates increased, difficult breathing, perspiration, dizziness, ringing in ears, lips blue, tremors and weakness, fatigue upon exertion, drowsiness, nausea and vomiting, unconsciousness.

TREATMENT OF ASPHYXIA: Remove from oxygen-deficient atmosphere. If not breathing, administer artificial respiration, preferably mouth-to-mouth. Call a physician. Keep under medical observation for 24 hours if rendered unconscious due to oxygen-deficiency.

TREATMENT FOR INJURIES FROM BURNS: Cover burns with dry sterile dressing. Place under care of a physician.

STABILITY		CONDITIONS TO AVOID
Unstable	Stable	
	X	See Section IX

INCOMPATIBILITY (materials to avoid)

Oxygen, oxidizing agents

HAZARDOUS DECOMPOSITION PRODUCTS

None

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
May Occur	Will not Occur	
	X	-----

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

DANGER: Forms explosive mixtures with air (see Section IV).

Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if without risk. Reduce gas with fog or fine water spray. Shut off leak if without risk. Ventilate area of leak or move leaking container to well-ventilated area.

CAUTION: Flammable gas may spread from spill. Before entering area, especially confined areas, check atmosphere with appropriate device.

WASTE DISPOSAL METHOD

Prevent waste from contaminating surrounding environment. Keep personnel away.

Call supplier for disposal information.

RESPIRATORY PROTECTION (specify type)

Self-contained breathing apparatus where needed.

VENTILATION	LOCAL EXHAUST	Explosion-proof system is acceptable.
	MECHANICAL (general)	Inadequate
	SPECIAL	-----
	OTHER	-----

PROTECTIVE GLOVES Preferred for cylinder handling.**EYE PROTECTION** Safety glasses**OTHER PROTECTIVE EQUIPMENT** Metatarsal shoes for cylinder handling.**DANGER:** Flammable gas under high pressure.

Use piping and equipment adequately designed to withstand pressures to be encountered. May form explosive mixtures with air.

Ground all equipment. Only use spark-proof tools and explosion-proof equipment. Keep away from heat, sparks and open flame. Store and use with adequate ventilation at all times. Use only in a closed system. Close valve when not in use and when empty.

PREVENT FIRE — Protect cylinders from direct sunlight and store in well-ventilated area. Protect containers from physical damage. Preferably, isolate from cylinders of oxygen and chlorine. Do not load together with explosives, poisons, radioactive materials and organic peroxides.

In event of fire, cool cylinders with water spray from safe distance.

OTHER HANDLING AND STORAGE CONDITIONS

Keep away from oxidizing agents.

UNION CARBIDE CORPORATION
LINDE DIVISION

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